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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/941,838	08/30/2001	Daisaku Horie	44239-084	7437

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EXAMINER

QIN, YIXING

ART UNIT	PAPER NUMBER
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2622

DATE MAILED: 04/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/941,838	Applicant(s) HORIE, DAISAKU	
	Examiner Yixing Qin	Art Unit 2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 August 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>08/30/2001</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 10 and 11 and their dependent claims 12 and 13 are rejected under 35 U.S.C. 101 because the following claim format is unacceptable and subject to a 101 rejection:

"A computer program for performing the steps of ..."

Such a claim is non-statutory because the terminology "computer program" alone has no set definition. The following claim formats are acceptable and not subject to a 101 rejection:

"A computer program embodied in a computer readable medium for performing the steps of ..."

"A computer readable medium storing a program for performing the steps of...".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

I. Claim 1, 2 and 5 and 7 rejected under 35 U.S.C. 102(b) as being anticipated by Moro (U.S. Patent No. 5,995,245).

1. Claim 1

A distortion correction device comprising:

- **an image signal acquiring unit for acquiring an image signal generated by an imaging unit imaging an object, said image signal representing an image of the object;**
- Moro discloses in column 4, lines 26-28, that his invention contains “...an image reading unit 30 that converts the image of the document into electric signals...”
- **a detecting unit for detecting a line image from the image of said object;**
- Moro discloses in Fig. 1 (item 31) and column 4, line 57 that the “...image reading unit 30 has line sensor 31...”
- **a relative position calculating unit for calculating a relative position of said imaging unit with respect to said object according to said line image detected by said detecting unit;**
- Moro discloses in Figs. 7A and 7B and column 6, lines 23-26 that “FIGS. 7A and 7B are drawings to explain the method of measurement regarding the curved condition of the surface of the document. The dotted line in FIG. 7A indicates the position of a line that is being measured.” One can see in Figs. 7A and 7B that the outline of the book is clearly distinguished from the dark background.

- **a height distribution calculating unit for calculating a height distribution of an imaged surface of said object according to said calculated relative position and said detected line image; and**
- Moro discloses in Fig. 8 and column 7, lines 18-29 the steps for measuring height using a height measuring unit 110. Lines 28-29, especially, sums the process up as, "[i]n other words, the height of the document surface S1 is measure."
- **a processing unit for processing said image signal to correct distortion of the image of said object according to said calculated height distribution.**
- Moro discloses in column 7, lines 41-49 that a "...CPU 101 performs setting regarding various image processing routines including image distortion correction, density adjustment and correction of unevenness in luminance, as well as the output image range (effective reading range) based on the measurement data including height data DH and size data DS, in preparation for the main scanning."

2. Claim 2

The distortion correction device according to claim 1, wherein

- **said line image includes an image of an end of said object, an image of a continuous line or a character string formed on the surface of said object.**
- Moro discloses in column 5, lines 2-5, that "[a] two-dimensional reading of a document image is accomplished by the aforesaid horizontal movement. That is, in book scanner 1, a two-dimensional image sensing plane is formed by the

movement of line sensor 31." A two-dimensional plane is formed of many lines, and, when scanning a book, will include images of the ends of the book or "character strings" or "continuous lines" (i.e. the edges of the book or page).

3. Claim 5

The distortion correction device according to claim 1, further comprising

- an edge image generating unit for generating an edge image with edges of said image enhanced, wherein
- Again, from Fig. 7A and 7B of Moro, one can see that the background is clearly distinguished from the book (i.e. **edges are enhanced** - column 6, lines 37-38).
- **said detecting unit refers to said edge image to detect said line image.**
- Moro discloses in column 2, lines 47-49 that his invention includes "a means that projects the optical image of an edge surface of an open book document that extends parallel to the bilateral direction of the book onto the line sensor" Moro discloses in column 4, lines 59-61 that this means is an "...optical system OS comprising mirror 33 and image0forming lens 32."

4. Claim 7

A camera comprising:

- an imaging unit for converting an optical image of an object into an electric signal to generate an image signal; and

- Moro discloses in column 6, lines 26-27 that “...image reading unit 30 [converts] the image of the document into electric signals.”
- **a processor for calculating a positional relation between said imaging unit and said object according to said image signal and correcting said image signal according to said calculated positional relation to represent an image of said object as a plane object.**
- Moro discloses in Fig. 8, a signal processing unit. Two key components are the height measuring unit 110 (i.e. **to calculation positional relation** column 7, lines 19-29) and the CPU 101 (column 7, lines 42-48). The CPU 101 performs “...various processing routines including image distortion correction...based on the measurement data including the height data DH...”

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

II. Claim 6 is are rejected under 35 U.S.C. 103(a) as being unpatentable over Moro (U.S. Patent No. 5,995,245)

5. Claim 6

The distortion correction device according to claim 5, further comprising

- **a pre-processing unit for performing a predetermined preprocessing on said acquired image signal, said pre-processing unit performing at least one of scaling up/down, sharpness enhancement, white pixel expansion and smoothing, wherein**
- Moro discloses in Fig. 6 and column 5, lines 63-64 that “Fig. 6 is a simplified drawing regarding focus adjustment during pre-scanning.” Column 6, lines 1-3, discloses that “[c]orrection of image distortion and a process to compensate for the difference in luminance are also necessary.” One skilled in the art would understand that the specific pre-processing as claimed are just different forms of image distortion correction.
- **said edge image generating unit generates said edge image based on said pre-processed image signal.**
- Moro discloses in column 6, lines 16-21 that “[i]n the second pre-scanning in the third mode and the main scanning in the second and third mode... focus adjustment is performed, in which image-forming lens 32 is moved in response to the result of the measurement of the curved condition of document surface S1.” These scanings occur after the “first” pre-scanning that is discussed in the rejection to the first limitation of this claim.

III. Claims 3,4, 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moro (U.S. Patent No. 5,995,245) and in view of Matsuda (U.S. Patent No. 5,808,756).

6. Claim 3

The distortion correction device according to claim 1, wherein

- **said relative position calculating unit calculates the relative position as a distance of height between said imaging unit and the surface of said imaged object and a distance in a lateral direction crossing the direction of height between said imaging unit and the surface of said imaged object.**
- Moro discloses in Figs. 2A and 2B the movement of the line sensor in a lateral direction (column 4, lines 64-67). However, Moro does not explicitly disclose the measuring of the height between the imaging unit and the surface of the imaged object.
- The secondary reference, Matsuda, discloses in Fig. 2A (item S3) and column 5, lines 17-20 that "FIG. 2 shows the positional relationship between document surface S2 and image sensing surface S3." From Fig. 2 and the equations in columns 5 and 6 (note especially variable H_m in column 5, line 50), one can see that Matsuda can calculate various angles and values, including one of which is a height between the imaging unit and the surface of an object (i.e. a book).
- Since both references are in the art of scanning book documents and the correction of distortion. This will serve as the motivation for the combination of these two references from hereon. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to create a calculation device using various equations as disclosed by Matsuda in Moro's invention.

The motivation would be to have better distortion correction algorithms by knowing the various distances from the imaging unit to the imaged object.

7. Claim 4

The distortion correction device according to claim 3, wherein

- **said detecting unit detects at least two line images from said acquired image signal, and**
- Again, from the rejection to claim 2 above, Moro discloses that “...a two-dimensional image sensing plane is formed by the movement of line sensor 31.”
A two-dimensional plane has at least two lines.
- **said relative position calculating unit calculates said distance in the lateral direction between said imaging unit and the surface of said imaged object according to inclination of said two line images.**
- One can see in Figs. 2A and 2B of Moro two lines indicating the movement of the line sensor 31 (i.e. **detecting** unit). Fig. 2A of Matsuda further shows that height (i.e. **distance between imaging unit and object**) can be measured using lines and angles.

8. Claim 8

A camera comprising:

- **an imaging unit for converting an optical image of an object into an electric signal to generate an image signal;**

- Moro discloses in column 6, lines 26-27 that “...image reading unit 30 [converts] the image of the document into electric signals”
- **a first calculating unit for calculating respective heights of parts of said object according to said image signal;**
- Moro discloses in Figs. 7A and 7B and column 6, lines 23-26 that “FIGS. 7A and 7B are drawings to explain the method of measurement regarding the curved condition of the surface of the document.”
- **a second calculating unit for calculating a positional relation between said object and said imaging unit according to said image signal; and**
- This limitation has been addressed in the rejection to claim 3 above. Please refer to claim 3 for explanation.
- **a correcting unit for correcting an image of said object represented by said image signal to scale up or down said image according to the respective heights of the parts of said object calculated by said first calculating unit and said positional relation calculated by said second calculating unit.**
- Moro discloses in column 7, lines 3-13 that “...regarding the main scanning direction, a plane that is a certain distance above document table 20 (5 cm, for example) is deemed a reference plane, and upper surface image G1 is magnified depending on the difference in terms of vertical position between the reference plane and document surface S1 at each point along the sub-scanning direction. Regarding the sub-scanning direction, upper surface image G1 is magnified in accordance with the ratio of the length per increment on document surface S1

along the bilateral direction to the length of the same increment that is projected on document table 20.” These values of height and position can be calculated using the various calculation units and techniques (i.e. equations) as discussed above in the rejections to claims 3 and 7.

9. Claim 9

A method of correcting an image produced by imaging a surface of an opened book facing upward from above of the surface of said book by a camera having a non-fixed positional relation with said book, comprising the steps of:

- **imaging the surface of said opened book to generate an electric signal representing the image of the surface of said book;**
- Moro discloses in column 6, lines 26-27 that “...image reading unit 30 [converts] the image of the document into electric signals”
- **measuring a distance between said camera and the surface of said book;**
- This limitation has been addressed in the rejection to claim 3 above. Please refer to claim 3 for explanation.
- **extracting, according to said electric signal, an edge image corresponding to an upper or lower end of said book in the image represented by said electric signal;**
- Again, from Fig. 7A and 7B of Moro, one can see that the background is clearly distinguished from the book (i.e. **edges are enhanced** - column 6, lines 37-38).

- **determining a position of said camera relative to the surface of said book according to said extracted edge image;**
- Again, from the rejection to claim 3 above, the secondary reference, Matsuda, discloses equations for the calculation of the height between an image sensing unit S3 and a book surface S2. One can see that in the two-dimensional view of the book surface in both Fig. 2A of Moro and Fig. 2a of Matsuda, that the surface forms an edge.
- **determining a height distribution of said upper or lower end of the surface of said book according to said measured distance, said extracted edge image of the upper or lower end of said book, and said position of said camera relative to the surface of said book;**
- Moro discloses in column 6, lines 55-58 that “[t]he curved condition of document surface S1, i.e., the height distribution, is specified by the aggregate of data indicating the height of document surface S1 at each line.” The edge image of the book can be seen in Fig. 2A of Moro and Fig. 2a of Matsuda.
- Moro discloses in Fig. 5 and column 5, lines 50-54 that “[i]n order to detect the rotation angle position of cam 322 that corresponds to the position of slider 323, photointerrupters S321 and S322 are mounted as position sensors near cam 322 and light shield 326 is mounted to cam 322.”
- **determining a height distribution of an entire image of the surface of said book on the supposition that said book is at the same height in the direction in which said book is opened; and**

- Moro discloses in column 6, lines 55-58 that “[t]he curved condition of document surface S1, i.e., the height distribution, is specified by the aggregate of data indicating the height of document surface S1 at each line.”
- **converting, according to said determined height distributions, said image signal into a signal representing an image of the surface of said book as a plane surface.**
- Moro discloses in column 6, lines 66-67 and column 7, lines 1-3 that “during main scanning, image processing is performed in which the curved upper surface image G1 is corrected into an image that would be obtained if the height of document surface S1 were constant (image distortion correction).”

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yixing Qin whose telephone number is (571)272-7381. The examiner can normally be reached on M-F 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Coles can be reached on (571)272-7402. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

A handwritten signature in black ink, appearing to be 'AL' followed by a long horizontal stroke.

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YQ

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